Trend Study 18A-32-07

Study site name: East Hickman Canyon . Vegetation type: Chained, seeded P-J .

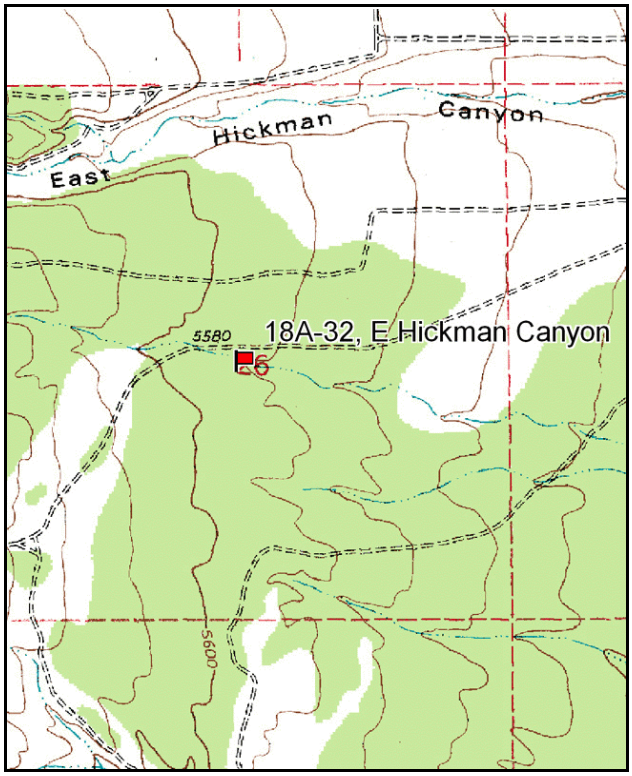
Compass bearing: frequency baseline 199 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

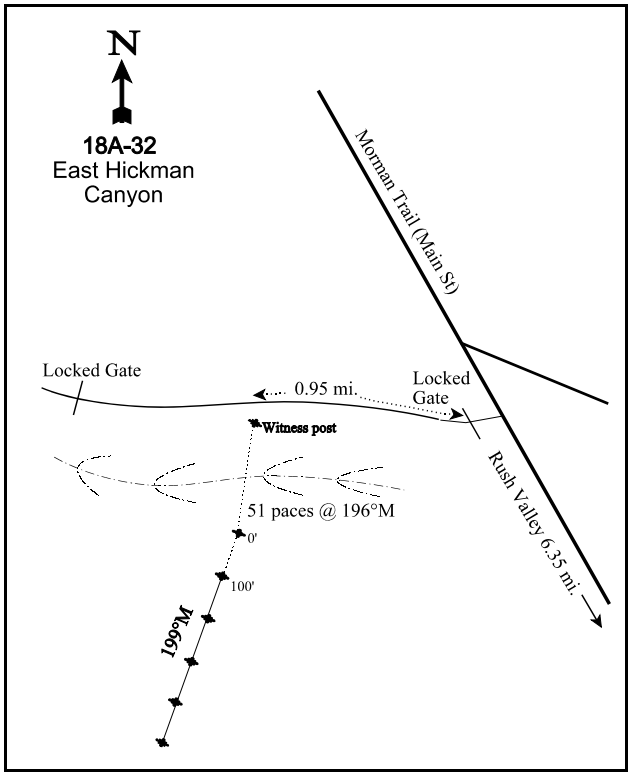
From the intersection of Center and Main Streets in Rush Valley, drive north on Main Street/Mormon Trail 6.35 miles to a dirt road on the left (west). Turn left on this road and proceed a short distance to the locked gate. From the gate, continue 0.95 miles to the west to a witness post on the left side of the road. From the witness post walk 51 paces across the gully at 196 degrees magnetic to the 0-foot stake. The study is marked by green, steel fenceposts 12-18 inches in height. The 0-foot stake is marked by browse tag # 440. In 2002 the site had to be reached by driving up East Hickman Canyon, crossing the creek and driving in from the west. That road is also blocked by a locked gate.

Gates are locked. Contact land owner.



Map name: South Mountain

Township 4S , Range 6W , Section 26



Diagrammatic Sketch

GPS: NAD 83, UTM 12T 373543 E 4477789 N

DISCUSSION

East Hickman Canyon - Trend Study No. 18A-32

Study Information

This study was established in 1997 to obtain pretreatment data for a juniper (*Juniperus osteosperma*) chaining and seeding project completed in 1999. The site supported a thick juniper woodland with a poor understory, and while the chaining improved the understory, it also reduced wildlife cover [elevation: 5,600 feet (1,707 m), slope: 5%, aspect: east]. Deer use was very light in 1997, with a pellet group frequency of 13%, and rabbit use was much higher at 41%. Since the chaining project, wildlife use has been low, and cattle use has increased. Pellet group transect data estimated only 2 deer days use/acre (5 ddu/ha) in 2002 and 1 deer day use/acre (2 ddu/ha) in 2007. There were 5 cattle days use/acre (13 cdu/ha) in 2002 and 36 cattle days use/acre (65 cdu/ha) in 2007. Grasses were very heavily grazed in 2007.

Soil

The soil is classified within the Borvant series (USDA-NRCS 2007). The soils in this series are well-drained, and are formed in alluvium or colluvium derived from limestone and sandstone. Soil analysis showed a fine clay loam with a hardpan at a depth of about 13-15 inches (33-38 cm). There are very few rocks on the surface or within the soil profile. The soil reaction is neutral (pH 7.3), and phosphorus is moderately low at only 6.5 ppm. There is a high percentage of bare ground exposed, with 28% average relative bare ground cover since 1997. Erosion was apparent in 1997. The erosion condition class was stable in 2002 and slight in 2007, due to moderate pedestalling and slight surface litter movement and flow patterns.

Browse

Prior to the chaining, the site was dominated by juniper trees. In 1997, canopy cover for juniper averaged 31%, with a density of 295 trees/acre (729 trees/ha) and an average diameter of almost 5 inches (13 cm). Since the treatment, juniper canopy cover declined to approximately 10% in 2002 and 2007. Density had decreased to 146 trees/acre (361 trees/ha) by 2002, and increased to 240 trees/acre (593 trees/ha) in 2007. This area may need to be treated again due to the increasing juniper density. Average diameter of trees was 5 inches (12.7 cm) in 2002 and 4.1 inches (10.4 cm) in 2007.

In 1997, mountain big sagebrush (*Artemisia tridentata* spp. *vaseyana*) density was estimated at only 80 plants/acre (198 plants/ha), and these were all classified as decadent and dying. There were an estimated 1,220 dead plants/acre (3,015 plants/ha). Any preferred browse species that may have been seeded in the treatment did not establish. The density of mountain big sagebrush has remained stable at 80 plants/acre (198 plants/ha) since 1997, but vigor has improved dramatically and there is a more balanced age structure. Annual leader growth was 3.2 inches (8.2 cm) in 2002 and 1.4 inches (3.6 cm) in 2007. Other shrub species, such as stickyleaf low rabbitbrush *(Chrysothamnus viscidiflorus* ssp. *viscidiflorus*), rubber rabbitbrush (*Chrysothamnus nauseosus*), and broom snakeweed (*Gutierrezia sarothrae*) have been sampled in low densities.

Herbaceous Understory

Prior to the chaining, the abundant cover and density of juniper suppressed understory species. Total herbaceous cover was less than 9%, with the total cover for forbs less than 1%. Sandberg bluegrass (*Poa secunda*) and mutton bluegrass (*Poa fendleriana*) made up 80% of the herbaceous cover, both of which provide poor forage value. Forbs provided less than 1% cover previous to the treatment. After the treatment, total herbaceous cover increased to 28% in 2002 and 19% in 2007, with the majority from seeded grasses. Crested wheatgrass (*Agropyron spicatum*) was the most abundant understory species, providing 15% cover in 2002 and 12% in 2007. Total forb cover increased to 6% in 2002 and decreased to 1% by 2007. The forb composition is diverse but dominated by annuals. Bur buttercup (*Ranunculus testiculatus*) and pale alyssum (*Alyssum alyssoides*) provided 83% of the total forb cover in 2002 and approximately 70% in 2007.

2002 TREND ASSESSMENT

The trend for key browse is slightly up. Juniper canopy cover decreased from 31% to 8%, which opened up the understory for the establishment of other species. The density of mountain big sagebrush remained stable at 80 plants/acre (198 plants/ha). However, the number of decadent plants decreased from 100% of the population to 25%. Use decreased, and vigor improved dramatically. The trend for grasses is slightly up. The sum of nested frequency for perennial grasses increased 20%, and average perennial grass cover increased from 8% to 21%. Seeded grasses established well. Crested wheatgrass was the most prominent species, providing 69% of the grass cover and 55% of the total herbaceous cover. However, Sandberg bluegrass decreased significantly in nested frequency, while cheatgrass (*Bromus tectorum*) increased significantly. The trend for forbs is slightly up. The sum of nested frequency for perennial forbs increased 92%, and total forb cover increased from 1% to 6%. The forb composition was diverse, but dominated by annuals. Bur buttercup was the most abundant forb, and comprised 71% of the total forb cover. Seeded alfalfa established and should persist if not heavily grazed. The Desirable Components Index (DCI) was rated as very poor in 1997 due to a lack of browse cover and poor understory. Despite some improvements in 2002, the index remained very poor.

1997 winter range condition (DCI) - very poor (17) Low potential scale
2002 winter range condition (DCI) - very poor (31) Low potential scale
browse - slightly up (+1) grass - slightly up (+1) forb - slightly up (+1)

2007 TREND ASSESSMENT

The trend for browse is stable. The density of mountain big sagebrush did not change since 2002. However, the population consisted of only young and mature plants in 2007. Young plants in the population increased from 25% in 2002 to 50% in 2007. Sagebrush vigor was good, and use was light. The trend for grass is stable. The average grass cover decreased from 22% to 18%, which comprised 73% of the total vegetative cover. The sum of nested frequency for perennial grasses increased 14%. There was a significant increase in the nested frequency of intermediate wheatgrass, and a significant decrease in the nested frequency of bottlebrush squirreltail (*Sitanion hystrix*). The nested frequency of cheatgrass remained relatively stable. The trend for forbs is slightly down. The sum of nested frequency for perennial forbs decreased substantially. Annual species continued to dominate the forb component of the understory. There was a significant increase in the nested frequency of pale alyssum and a significant decrease in the nested frequency of bur buttercup. Seeded alfalfa was not sampled in any quadrats. Eleven forb species that were present in 2002 were not noted in 2007. Forbs only provided an average of 6% cover. The DCI continued to be rated as very poor.

winter range condition (DCI) - very poor (31) Low potential scale
browse - stable (0) grass - stable (0) forb - slightly down (-1)

HERBACEOUS TRENDS --
Management unit 18A, Study no: 32

Type	Species	Nested Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
G	Agropyron cristatum	-	a231	a260	-	15.33	12.09
G	Agropyron intermedium	-	a31	b72	-	1.02	2.49
G	Agropyron spicatum	a50	a37	a52	.43	1.60	.77
G	Aristida purpurea	-	2	-	-	.00	-
G	Bromus inermis	-	a4	a16	-	.03	.15

Type	Species	Nested Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
G	Bromus japonicus (a)	-	12	-	-	.03	-
G	Bromus tectorum (a)	$_{a}$15	$_{b}$90	$_{b}$55	.19	.79	.35
G	Elymus cinereus	-	-	2	-	-	.15
G	Elymus junceus	-	$_{a}$-	$_{b}$23	-	.00	.41
G	Oryzopsis hymenoides	-	-	10	-	-	.21
G	Poa bulbosa	-	-	-	-	.00	-
G	Poa fendleriana	48	-	-	1.43	-	-
G	Poa secunda	$_{b}$277	$_{a}$140	$_{a}$99	5.67	2.36	.99
G	Sitanion hystrix	$_{b}$17	$_{b}$25	$_{a}$2	.16	.98	.03
Total for Annual Grasses		15	102	55	0.19	0.81	0.34
Total for Perennial Grasses		392	470	536	7.72	21.36	17.32
Total for Grasses		407	572	591	7.92	22.18	17.68
F	Alyssum alyssoides (a)	$_{a}$1	$_{b}$84	$_{c}$227	.00	.66	.54
F	Allium sp.	$_{a}$4	$_{a}$5	$_{a}$1	.01	.04	.00
F	Antennaria rosea	$_{a}$2	$_{a}$9	$_{a}$2	.00	.05	.00
F	Arabis sp.	1	-	-	.00	-	-
F	Astragalus convallarius	$_{a}$16	$_{a}$10	$_{a}$11	.28	.07	.10
F	Astragalus sp.	-	1	-	-	.00	-
F	Camelina microcarpa (a)	-	1	-	-	.00	-
F	Collinsia parviflora (a)	$_{a}$33	$_{a}$21	$_{a}$32	.15	.03	.05
F	Crepis acuminata	$_{a}$1	$_{a}$1	-	.03	.00	-
F	Cryptantha sp.	-	$_{a}$3	$_{a}$7	-	.03	.09
F	Descurainia pinnata (a)	-	-	1	-	-	.03
F	Draba sp. (a)	$_{a}$3	-	$_{a}$1	.00	-	.00
F	Epilobium brachycarpum (a)	-	14	-	-	.18	-
F	Gilia sp. (a)	-	3	-	-	.00	-
F	Heterotheca villosa	-	1	-	-	.00	-
F	Holosteum umbellatum (a)	1	-	-	.03	-	-
F	Lathyrus brachycalyx	$_{a}$5	$_{b}$16	$_{a}$5	.01	.13	.01
F	Lactuca serriola	$_{a}$2	$_{a}$1	-	.00	.00	-
F	Medicago sativa	-	33	-	-	.23	-
F	Microsteris gracilis (a)	-	12	-	-	.02	-
F	Phlox hoodii	$_{b}$18	$_{a}$3	$_{ab}$5	.28	.06	.06
F	Phlox longifolia	$_{a}$2	$_{b}$8	$_{ab}$4	.00	.02	.03
F	Polygonum douglasii (a)	-	2	-	-	.00	-
F	Ranunculus testiculatus (a)	$_{a}$50	$_{c}$231	$_{b}$124	.13	4.04	.41

Type	Species	Nested Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
F	Senecio multilobatus	-	-	2	-	-	.00
F	Sisymbrium altissimum (a)	-	2	-	-	.03	-
F	Sphaeralcea coccinea	-	$_{a}$7	$_{a}$3	-	.01	.03
F	Tragopogon dubius	-	-	-	-	.00	-
Total for Annual Forbs		88	370	385	0.32	4.99	1.04
Total for Perennial Forbs		51	98	40	0.63	0.69	0.34
Total for Forbs		139	468	425	0.95	5.68	1.38

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 18A, Study no: 32

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Artemisia tridentata vaseyana	3	4	4	.18	.03	.06
B	Chrysothamnus nauseosus	0	0	1	-	-	-
B	Gutierrezia sarothrae	1	5	10	-	.00	.10
B	Juniperus osteosperma	24	14	13	16.54	5.28	4.84
Total for Browse		28	23	28	16.73	5.32	5.00

CANOPY COVER, LINE INTERCEPT --
Management unit 18A, Study no: 32

Species	Percent Cover		
	'97	'02	'07
Artemisia tridentata vaseyana	-	.21	.10
Gutierrezia sarothrae	-	.05	.36
Juniperus osteosperma	31.20	7.63	9.88

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 18A, Study no: 32

Species	Average leader growth (in)	
	'02	'07
Artemisia tridentata vaseyana	3.2	1.4

POINT-QUARTER TREE DATA --
Management unit 18A, Study no: 32

Species	Trees per Acre	
	'02	'07
Juniperus osteosperma	146	240

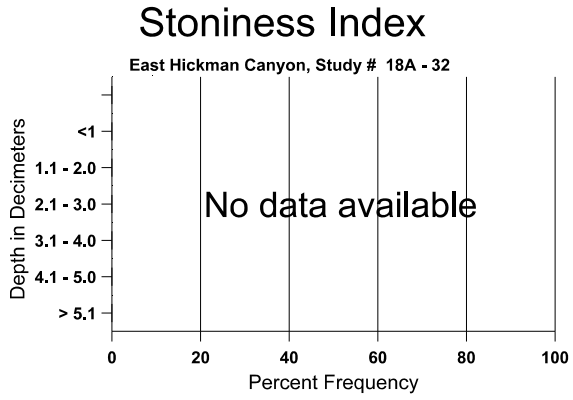
Average diameter (in)	
'02	'07
3.2	4.1

BASIC COVER --
Management unit 18A, Study no: 32

Cover Type	Average Cover %		
	'97	'02	'07
Vegetation	26.19	32.68	27.03
Rock	1.12	.17	.20
Pavement	4.89	4.38	3.60
Litter	30.51	47.92	45.02
Cryptogams	13.01	.09	.08
Bare Ground	34.45	28.27	31.06

SOIL ANALYSIS DATA --
Herd Unit 18A, Study no: 32, East Hickman Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	Clay loam			%0M	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
15.1	56.6 (15.3)	7.3	36.7	34.7	28.6	2.0	6.5	134.2	.4



PELLET GROUP DATA --
Management unit 18A, Study no: 32

Type	Quadrat Frequency		
	'97	'02	'07
Rabbit	41	31	58
Deer	13	4	-
Cattle	-	-	3

Days use per acre (ha)	
'02	'07
-	-
2 (5)	1 (2)
5 (13)	26 (65)

BROWSE CHARACTERISTICS --
Management unit 18A, Study no: 32

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
97	**80**	-	-	-	80	1220	0	75	100	100	100	-/-
02	**80**	-	20	40	20	-	0	0	25	25	25	18/23
07	**80**	20	40	40	-	-	0	0	0	-	0	17/25
Chrysothamnus nauseosus												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
02	**0**	-	-	-	-	-	0	0	-	-	0	-/-
07	**20**	-	-	20	-	-	0	0	-	-	0	17/15
Chrysothamnus viscidiflorus viscidiflorus												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
02	**0**	-	-	-	-	-	0	0	-	-	0	10/22
07	**0**	-	-	-	-	-	0	0	-	-	0	7/16
Cowania mexicana stansburiana												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
02	**0**	-	-	-	-	-	0	0	-	-	0	9/12
07	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Gutierrezia sarothrae												
97	**20**	-	-	20	-	-	0	0	0	-	0	-/-
02	**120**	-	-	100	20	-	0	0	17	-	0	8/15
07	**440**	60	40	340	60	20	0	5	14	9	9	9/11
Juniperus osteosperma												
97	**540**	60	60	480	-	-	0	0	0	-	0	-/-
02	**300**	20	100	160	40	240	0	0	13	-	40	52/35
07	**280**	20	20	260	-	-	7	0	0	-	64	-/-